Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII EXAMINATION – SUMMER 2016

Subject Code:180604 **Date:18/05/2016**

Subject Name:Structural Design II

Time:10:30 AM to 01:30 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of IS:800, IS:875,IS:456,IS:3370,SP-16 and steel table is permitted.**
5. **Material is M20 grade concrete and Fe 415 Steel for RCC and fy=250 Mpa for steel if not specified.**

Q.1 (a) For the counterfort retaining wall of height 7m above G.L., fix the basic dimensions of the various elements. Angle of repose of soil is 30°. SBC of soil is 180 kN/m^2 and density of soil is 18 kN/m^3. Friction coefficient between soil and concrete is 0.55. Design and detail the stem of retaining wall. **14**

Q.2 (a) List the elements of the plate girder. Explain different types of stiffeners in detail with their codal provisions. **07**

(b) For a structural lay out of G+3 storey building as shown in **figure 1** calculate the load coming on to the column B at level of storey 1. Take live load on roof and floor 1 kN/m^2 and 4 kN/m^2 respectively, Floor finish 1 kN/m^2, Thickness of slab 120 mm, Beam dimension 230 mm width and 450 mm overall depth, all wall thickness 230 mm, column dimension 350 mm X 350 mm. **07**

OR

(b) For a structural lay out of G+3 storey building as shown in **figure 1** calculate the load coming on to the Beam ABCD for the same data as in Q.2(b) above. Also draw load distribution diagram. **07**

Q.3 (a) Design a gantry girder without lateral restraint along its span carrying EOT crane of capacity 200 kN & center to center distance between column is 10 m. Consider Span of crane girder =18 m, Wheel spacing =3.5m, Weight of rail 0.4 kN/m, Weight of crab = 50 kN, Minimum hook approach = 1.2 m. Weight of crane girder = 180 kN. Use Fe 410 steel. Only show the check for shear and moment only for the section. **14**

OR

Q.3 (a) Design a welded plate girder for a simply supported bridge deck 20 m in span subjected to a point load of 200 kN at distance 5 m from both ends in addition to the imposed load of 20 kN/m and dead load excluding self weight is 20 kN/m., Provide only end stiffeners and avoid the intermediate transverse stiffener. Use simple post critical method. **14**

Q.4 (a) Fix the dimensions of circular overhead water tank container with flat bottom for a capacity of 4 lakh liters. Design and detail top spherical dome, top ring beam and cylindrical wall of the container. Take live load 1.5 kN/m2 and diameter of tank 12m. Use M25 grade concrete and Fe 415 steel. **14**

OR

Q.4 (a) Estimate wind load and plot wind pressure diagram in critical direction for a multi storey building of plan area 12 m X 16 m situated on hilly area for the following data. **14**

Height of building = 19 m
Bottom Storey height = 4 m
All other storey height = 3 m
Bay width in both direction = 4 m
location of Building = Ahmedabad,
Terrain Category= II
Ground slope= 1 vertical to 10 horizontal on both side of crest
Hill height= 120 m,
Location from crest =100 m leeward,
Design life 100 years.

Q.5 (a) Roofing system of an industrial shed consists of trusses spaced at 5 m apart. The span of roof truss is 24 m and pitch is 1/4. The level of eaves is 10 m above the ground. Assume suitable configuration of truss. Design bottom chord member near support only. The shade is situated on flat terrain with sparsely populated buildings. The shed has less than 10% permeability. **14**

OR

Q.5 (a) Design a cross beam and a top chord member U_1U_2 for a foot over bridge shown in **figure 2**. Span of bridge is 24m and pedestrian load on bridge is 4 kN/m^2. The clear distance between two trusses is 3.0m. Take dead weight of truss as 1.20 kN/m. **14**

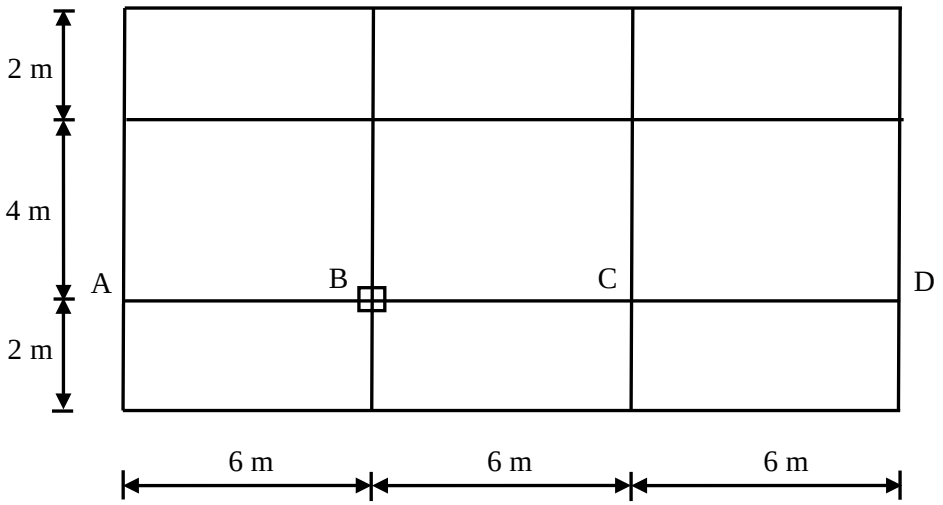

Figure 1

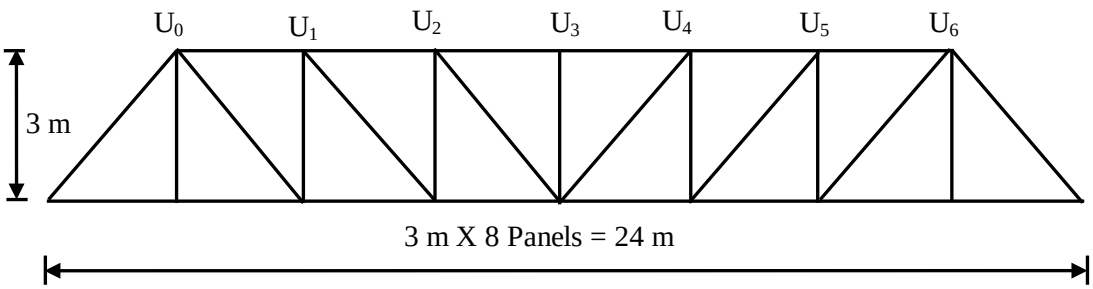

Figure 2

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